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EXAMINER	
HOLDER, ANNER N	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/811,983	PURI ET AL.	
	Examiner	**Art Unit**	
	ANNER HOLDER	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _10 September 2009_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-35 and 37-53_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-35 and 37-53_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _01 July 2008_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _07/17/09; 07/13/09_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Argument

1. Applicant's arguments with respect to claims 1-33 and 40-53 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 9-10, 23-26, 40, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76.

4. As to claim 1, Yanagihara teaches a picture analyzer, to generate complexity indicators from each picture of an input video sequence; [fig. 11 (8); fig. 14 (8); col. 12 lines 6-9; col. 14 lines 6-8] a first quantizer estimator to generate a first quantizer estimate for each picture based on the complexity indicators, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] a second quantizer estimator, to generate a second quantizer estimate for each picture, the second quantizer estimates for I and P

pictures based on coding rates of previously-coded pictures; [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] and a quantizer selector to generate a quantizer parameter for each picture from the first and second quantizer estimates; [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

Yanagihara does not explicitly teach a target coding rate calculated for each picture; the use of linear regression regarding a quantizer and a transmit buffer fullness indicator representing a quantity of stored previously-coded video data; and a coding policy unit operative according to a rate control policy, wherein the rate control policy is selected by at least on a comparison of the first and second quantizer estimate.

Pian teaches a target coding rate calculated for each picture; [abstract; fig. 3; col. 8 lines 1-25] a transmit buffer fullness indicator representing a quantity of stored previously-coded video data; [fig. 3; col. 8 lines 1-25] a coding policy unit operative according to a rate control policy, wherein the rate control policy is selected by at least on a comparison of the first and second quantizer estimate. [abstract; fig. 3; col. 4 lines 44-62, the three quantizers provide three different estimates which is used to determine the bit rate; col. 6 lines 30-41]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the teachings of Pian with the device of Yanagihara allowing for reduced deterioration of image quality and improved coding efficiency.

Yanagihara (modified by Pian) does not explicitly teach the use of linear regression regarding a quantizer

Chiang teaches linear regression in determining a quantizer value. [abstract; 1. Introduction ¶ 1; 5. Rate Control for the MPEG-4 Coder]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the linear regression teachings of Chiang with the device of Yanagihara (modified by Pian) improving image quality and coding efficiency.

5. As to claim 9, Yanagihara (modified by Pian and Chiang) teaches the complexity indicator includes an indicator of spatial complexity within the picture. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19; the activity detection is applied to both inter and intra frame processing]

6. As to claim 10, Yanagihara (modified by Pian and Chiang) teaches the complexity indicator includes an indicator of motion complexity of the picture with respect to previously coded pictures. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19; the activity detection is applied to both inter and intra frame processing]

7. As to claim 23, Yanagihara (modified by Pian and Chiang) teaches a content characteristics and coding rate analyzer, responsive to pictures from an input video sequence, to generate complexity indicators representative thereof, [Yanagihara - fig. 11 (8); fig. 14 (8); col. 12 lines 6-9; col. 14 lines 6-8] a rate model quantizer estimator, responsive to quantizers and coding rates of previously-coded pictures and to picture type indicators of input pictures, [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] to estimate quantizer parameters of the input pictures to a linear regression analysis, wherein linear regression [Chiang - abstract; 1. Introduction ¶

1; 5. Rate Control for the MPEG-4 Coder] coefficients of input I pictures are selected according to the complexity indicators for such I pictures, an AVC coder including a forward quantizer operative according to the quantizer estimates. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

8. As to claim 24, see discussion of claim 9 above.

9. As to claim 25, see discussion of claim 10 above.

10. As to claim 26, see discussion of claim 11 above.

11. As to claim 40, see discussion of claim 1 above.

12. As to claim 44, see discussion of claim 1 above.

13. As to claim 48, Yanagihara teaches a content characteristics and coding rate analyzer, responsive to pictures from an input video sequence, to generate complexity indicators representative thereof, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] a buffer based quantizer computer, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] an activity based quantizer computer to calculate activity of each picture in the video sequence and modify the first quantizer estimate in response thereto, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] a rate model quantizer estimator, responsive to quantizers and coding rates of previously-coded pictures and to picture type indicators of input pictures, to estimate quantizer parameters of the input pictures an AVC coder including a forward quantizer operative according to the quantizer estimates; [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] an AVC coder including a forward quantizer operative according to the modified buffer-based quantizer estimate; [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line

62 - col. 14 line 19] to generate a buffer-based quantizer estimate for each picture, coefficients of input I pictures are selected according to the complexity indicators for such I pictures. [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

Yanagihara does not explicitly teach a target bits computer, responsive to the complexity indicators and to a picture type signal, to calculate a target coding rate for each picture in the video sequence, a buffer based quantizer computer, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal, the use of linear regression regarding a quantizer, quantizer computer, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal, a coding policy unit operative according to a rate control policy is <u>selected by at least on</u> a comparison of the first and second quantizer estimate.

Pian teaches a target bits computer, responsive to the complexity indicators and to a picture type signal, to calculate a target coding rate for each picture in the video sequence, [abstract; fig. 3; col. 8 lines 1-25] quantizer computer, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal, a coding policy unit operative according to a rate control policy is <u>selected by at least on</u> a comparison of the first and second quantizer estimate. [abstract; fig. 3; col. 4 lines 44-62, the three quantizers provide three different estimates which is used to determine the bit rate; col. 6 lines 30-41]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the teachings of Pian with the device of Yanagihara allowing for reduced deterioration of image quality and improved coding efficiency.

Yanagihara (modified by Pian) does not explicitly teach the use of linear regression regarding a quantizer.

Chiang teaches linear regression in determining a quantizer value. [abstract; 1. Introduction ¶ 1; 5. Rate Control for the MPEG-4 Coder]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the linear regression teachings of Chiang with the device of Yanagihara (modified by Pian) improving image quality and coding efficiency.

14. Claims 49 and 50-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 further in view of Nam et al. US 5,617,150.

15. Claim 49, Yanagihara (modified by Pian and Chiang) teaches the limitations of claim 1.

Yanagihara (modified by Pian and Chiang) does not explicitly teach for P and B pictures, the target coding rate is predetermined target coding rate if a scene change detection signal indicates a scene change.

Nam teaches for P and B pictures, the target coding rate is predetermined target coding rate if a scene change detection signal indicates a scene change. [abstract; figs. 3-5; col. 3 lines 38-67; col. 4 lines 33-67; col. 5 lines 1-48]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Nam with the device of Yanagihara (modified by Pian and Chiang) allowing for improved picture quality and coding efficiency.

16. Claim 51, Yanagihara (modified by Pian Chiang and Nam) teach wherein for the P and B pictures, the target coding rate is predetermined target coding rate if a scene change detection signal indicates a scene change. [Nam - abstract; figs. 3-5; col. 3 lines 38-67; col. 4 lines 33-67; col. 5 lines 1-48]

17. Claim 52, Yanagihara (modified by Pian Chiang and Nam) teach for P and B pictures, the target coding rate is a predetermined target coding rate if a scene change detection signal indicates a scene change. [Nam - abstract; figs. 3-5; col. 3 lines 38-67; col. 4 lines 33-67; col. 5 lines 1-48]

18. As to claim 53, Yanagihara (modified by Pian Chiang and Nam) teach the target bits computer is further responsive to scene detection signal, and wherein for P and B pictures, the target coding rate is predetermined target coding rate if the scene change detection signal indicates a scene change. [Nam - abstract; figs. 3-5; col. 3 lines 38-67; col. 4 lines 33-67; col. 5 lines 1-48]

19. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1

20. Claim 50, the rate and quality control system of claim 12.

Yanagihara (modified by Pian) teaches the limitations of claim 12.

Yanagihara (modified by Pian) does not explicitly teach wherein the target bits computer is further responsive to scene detection signal, and wherein for P and B pictures, the target coding rate is predetermined target coding rate if the scene change detection signal indicates a scene change

Nam teaches wherein the target bits computer is further responsive to scene detection signal, and wherein for P and B pictures, the target coding rate is predetermined target coding rate if the scene change detection signal indicates a scene change. [abstract; figs. 3-5; col. 3 lines 38-67; col. 4 lines 33-67; col. 5 lines 1-48]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Nam with the device of Yanagihara (modified by Pian) allowing for improved picture quality and coding efficiency.

21. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 further in view Eckart US 7,277,483 B1.

22. As to claim 11, Yanagihara (modified by Pian and Chiang) teaches the limitations of claim 1.

Yanagihara (modified by Pian and Chiang) does not explicitly teach complexity indicator includes an indicator of a number of bits used to represent each pixel in the picture.

Eckart teaches complexity indicator includes an indicator of a number of bits used to represent each pixel in the picture. [fig. 2; fig. 8; col. 4 lines 31-67; col. 6 lines 49-60]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Eckart with the Device of Yanagihara (modified by Pian and Chiang) allowing improved rate control. [col. 2 lines 18-30]

23. Claims 2, 8, 27 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 and further in view of Kim US 5,777,812.

24. As to claim 2, Yanagihara (modified by Pian and Chiang) teaches the limitations of claim 1.

Yanagihara (modified by Pian and Chiang) is silent as a transform scaler, coupled to the forward quantizer, a forward scan unit, coupled to the transform scaler, a variable length coder, coupled to the forward scan unit, and a formatter, coupled to the variable length coder.

Kim teaches a transform scaler, coupled to the forward quantizer, a forward scan unit, coupled to the transform scaler, a variable length coder, coupled to the forward scan unit, and a formatter, coupled to the variable length coder. [fig. 6; col. 5 line 64 – col. 6 line 7]

It would have obvious to one of ordinary skill in the art to incorporate the teachings of Kim with the device of Yanagihara (modified by Pian and Chiang) to allow for improved image coding and quality.

25. As to claim 8, Yanagihara (modified by Pian, Chiang and Kim) teaches a spatial predictor that predicts video data for a block of input data according to intra prediction techniques, a temporal predictor that predicts video data for the block of input data according to temporal predictions between a current picture and one or more previously coded reference frames, [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] and a mode selector that selects an output from one of the spatial predictor or the temporal predictor for each block of input data, wherein the mode selector performs its selection based on mode decision control signals from the coding policy unit. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

26. As to claim 27, see discussion of claim 2 above.

27. As to claim 33, see discussion of claim 8 above.

28. Claims 3, 28, 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 in view of Kim US 5,777,812 further in view of Simpson et al. (Simpson) US 6,724,817 B1.

29. As to claim 3, Yanagihara (modified by Pian, Chiang and Kim) the limitations of claim 2.

Yanagihara (modified by Pian, Chiang and Kim) does not explicitly teach to eliminate non-zero quantized transform coefficients according to the rate control policy, and wherein the AVC coder further comprises a coefficient zeroer provided between the forward quantizer and the transform scaler, responsive to control from the coding policy unit, to eliminate selected quantized transform coefficients.

Simpson teaches to eliminate non-zero quantized transform coefficients according to a rate control policy, and wherein the AVC coder further comprises a coefficient zeroer provided between the forward quantizer and the transform scaler, responsive to control from the coding policy unit, to eliminate selected quantized transform coefficients. [fig. 1 (18); fig. 2 (118); col. 5 lines 5-59; col. 3 line 66 - col. 4 line 25]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Simpson with the device of Yanagihara (modified by Pian, Chiang and Kim) improving coding efficiency.

30. As to claim 28, see discussion of claim 3 above.

31. As to claim 41, see discussion of claim 3 above.

32. As to claim 45, see discussion of claim 3 above.

33. Claims 4, 29 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion

Model, IEEE, 1996, pgs. 73-76 in view of Kim US 5,777,812 in view of Simpson et al. (Simpson) US 6,724,817 B1 and further in view of Sugiyama US 6,940,911 B2.

34. As to claim 4, Yanagihara (modified by Pian, Chiang and Kim) teaches limitations of claim 2.

Yanagihara (modified by Pian, Chiang and Kim) does not explicitly teach to a coding policy unit, determines when it becomes necessary to eliminate pictures from the video sequence from being coded according to the rate control policy, and a video preprocessing unit, responsive to control from the coding policy unit, to perform frame decimation before pictures are input to the AVC coder.

Simpson teaches a coding policy unit, determines when it becomes necessary to eliminate pictures from the video sequence from being coded according to a rate control policy. [fig. 1 (18); fig. 2 (118); col. 5 lines 5-59; col. 3 line 66 - col. 4 line 25]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Simpson with the device of Yanagihara (modified by Pian, Chiang and Kim) improving coding efficiency.

Yanagihara (modified by Pian, Chiang, Kim and Simpson) is silent as to a video preprocessing unit, responsive to control from the coding policy unit, to perform frame decimation before pictures are input to the AVC coder.

Sugiyama teaches a video preprocessing unit, responsive to control from the coding policy unit, to perform frame decimation before pictures are input to the AVC coder. [fig. 1; fig. 7; fig. 11; fig. 14; col. 15 lines 10-19, 61-67; col. 16 lines 3-7]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sugiyama with the device of Yanagihara (modified by Pian, Chiang, Kim and Simpson) allowing for improved of the image quality.

35. As to claim 29, see discussion of claim 4 above.

36. As to claim 42, see discussion of claim 4 above.

37. Claims 4, 29 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 in view of Kim US 5,777,812 in view of Simpson et al. (Simpson) US 6,724,817 B1 in view of Sugiyama US 6,940,911 B2 further in view of Cheung et al. US 6,178,205.

38. As to claim 5, Yanagihara (modified by Pian, Chiang, Kim, Simpson and Sugiyama) teaches the limitations of claim 2.

Yanagihara (modified by Pian, Chiang, Kim, Simpson and Sugiyama) does not explicitly teach to determine when it becomes necessary to eliminate motion vectors according to a rate control policy, [and wherein the AVC coder includes a prediction circuit that generates motion vectors for prediction of video data of macroblocks in the input pictures and of video data for sub-blocks therein of various sizes, the prediction circuit responsive to control from the coding policy unit, to eliminate selected motion vectors from an output coded bitstream.

Cheung teaches to determine when it becomes necessary to eliminate motion vectors according to a rate control policy, [and wherein the AVC coder includes a prediction circuit that generates motion vectors for prediction of video data of macroblocks in the input pictures and of video data for sub-blocks therein of various sizes, the prediction circuit responsive to control from the coding policy unit, to eliminate selected motion vectors from an output coded bitstream. [col. 8 lines 18-33; col. 8 line 60 - col. 6 line 5]

It would have been obvious to one ordinary skill in the art at the time the invention was made to incorporate the teachings of Cheung with the device of Yanagihara (modified by Pian, Chiang, Kim, Simpson and Sugiyama) allowing for improved image quality.

39. As to claim 30, see discussion of claim 5 above.

40. As to claim 43, see discussion of claim 5 above.

41. Claims 4, 5, 29-30, and 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 in view of Simpson et al. (Simpson) US 6,724,817 B1 and further in view of Sugiyama US 6,940,911 B2.

42. As to claim 46, Yanagihara (modified by Pian and Chiang) teaches the limitations claim 44.

Yanagihara (modified by Pian and Chiang) does not explicitly teach determines when it becomes necessary to eliminate pictures from the video sequence from being coded

according to a rate control policy, and performing frame decimation before pictures are encoded.

Simpson teaches determines when it becomes necessary to eliminate pictures from the video sequence from being coded according to a rate control policy. [fig. 1 (18); fig. 2 (118); col. 5 lines 5-59; col. 3 line 66 - col. 4 line 25]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Simpson with the device of Yanagihara (modified by Pian and Chiang) improving coding efficiency.

Yanagihara (modified by Pian and Chiang and Simpson) does not explicitly teach to perform frame decimation before pictures are input to the AVC coder.

Sugiyama teaches to perform frame decimation before pictures are input to the AVC coder. [fig. 1; fig. 7; fig. 11; fig. 14; col. 15 lines 10-19, 61-67; col. 16 lines 3-7]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sugiyama with the device of Yanagihara (modified by Pian, Chiang and Simpson) allowing for improved of the image quality.

43. As to claim 47, Yanagihara (modified by Pian, Chiang, Simpson and Sugiyama) teaches generating motion vector predication of video data of macroblocks in the input pictures and of video data for sub-blocks therein of various sizes, [Sugiyama - Fig. 7; Fig. 11; Fig. 14; Col. 15 lines 10-19, 61-67; Col. 16 lines 3-7] determining when it becomes necessary to eliminate motion vectors according to the rate control policy, and eliminating selected motion vectors from an output coded bitstream. [Simpson - fig. 1 (18); fig. 2 (118); col. 5 lines 5-59; col. 3 line 66 - col. 4 line 25]

44. Claims 6-7, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view Chiang et al. (Chiang), A new rate Control Scheme Using Quadratic Rate Distortion Model, IEEE, 1996, pgs. 73-76 in view of Kim US 5,777,812 and further in view of Tsuru US 6,950,040 B2.

45. As to claim 6, Yanagihara (modified by Pian, Chiang and Kim teaches the limitations of claim 2.

Yanagihara (modified by Pian, Chiang and Kim) does not explicitly teach a deblocking filter.

Tsuru teaches a deblocking filter. [fig. 2; col. 6 lines 3-12]

It would have been obvious at the time the invention was made to combine the deblocking filtering teachings of Tsuru with the device of Yanagihara (modified by Pian, Chiang and Kim) improving image quality.

46. As to claim 7, Yanagihara (modified by Pian, Chiang, Kim and Tsuru) the coding policy unit calculates alpha and beta control parameters to be used by an H.264 deblocking filter. [Tsuru - fig. 2; col. 1 lines 12-15; col. 6 lines 3-12; well known in the art that alpha and beta parameters are used in deblocking]

47. As to claim 31, see discussion of claim 6 above.

48. As to claim 32, see discussion of claim 7 above.

49. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1.

50. As to claim 12, Yanagihara teaches a content characteristics and coding rate analyzer, responsive to pictures from an input video sequence, to generate complexity indicators representative thereof, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] a buffer based quantizer computer, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] to generate a buffer-based quantizer estimate for each picture, and an activity based quantizer computer to calculate activity of each picture in the video sequence and modify the buffer-based quantizer estimate in response thereto, [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] an AVC coder including a forward quantizer operative according to the modified buffer-based quantizer estimate. [fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

a target bits computer, responsive to the complexity indicators and to a picture type signal, to calculate a target coding rate for each picture in the video sequence, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal.

Yanagihara does not explicitly teach a target bits computer, responsive to the complexity indicators and to a picture type signal, to calculate a target coding rate for each picture in the video sequence, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal.

Pian teaches a target bits computer, responsive to the complexity indicators and to a picture type signal, to calculate a target coding rate for each picture in the video

sequence, responsive to the target coding rates, to a transmit buffer indicator signal and to the picture type signal. [abstract; fig. 3; col. 8 lines 1-25;] col. 4 lines 44-62, the three quantizers provide three different estimates which is used to determine the bit rate; col. 6 lines 30-41]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the teachings of Pian with the device of Yanagihara allowing for reduced deterioration of image quality and improved coding efficiency.

51. As to claim 13, Yanagihara (modified by Pian) teaches the complexity indicator includes an indicator of spatial complexity within the picture. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19; the activity detection is applied to both inter and intra frame processing]

52. As to claim 14, Yanagihara (modified by Pian) teaches the complexity indicator includes an indicator of motion complexity of the picture with respect to previously coded pictures. [Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19; the activity detection is applied to both inter and intra frame processing]

53. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 further in view Eckart US 7,277,483 B1.

54. As to claim 15, Yanagihara (modified by Pian) teaches the limitations of claim 12. Yanagihara (modified by Pian) does not explicitly teach complexity indicator includes an indicator of a number of bits used to represent each pixel in the picture.

Eckart teaches complexity indicator includes an indicator of a number of bits used to represent each pixel in the picture. [fig. 2; fig. 8; col. 4 lines 31-67; col. 6 lines 49-60]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Eckart with the Device of Yanagihara (modified by Pian) allowing improved rate control. [col. 2 lines 18-30]

55. Claims 16 and 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view of Hui US 6,654,417 B1 further in view of Kim US 5,777,812.

56. As to claim 16, Yanagihara (modified by Pian) teaches the limitations of claim 12.

Yanagihara (modified by Pian) does not explicitly teach an integer approximated transform circuit, to generate transform coefficients from input pixel data, the forward quantizer to divide the transform coefficients according to the modified buffer-based quantizer estimate.

Hui teaches an integer approximated transform circuit, to generate transform coefficients from input pixel data, the forward quantizer to divide the transform coefficients according to the modified buffer-based quantizer estimate. [Hui - fig. 2; fig. 3; col. 9 lines 12-60; col. 10 lines 3-23; col. 12 lines 24-47]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the teachings of Hui with the device of Yanagihara (modified by Pian) allowing for improved image quality.

Yanagihara (modified by Pian and Hui) is silent as to a transform scaler, coupled to the forward quantizer, a forward scan unit, coupled to the transform scaler, a variable length coder, coupled to the forward scan unit, and a formatter, coupled to the variable length coder.

Kim teaches a transform scaler, coupled to the forward quantizer, a forward scan unit, coupled to the transform scaler, a variable length coder, coupled to the forward scan unit, and a formatter, coupled to the variable length coder. [Kim - fig. 6; col. 5 line 64 – col. 6 line 7]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Kim with the device of Yanagihara (modified by Pian and Hui) to allow for improved coding efficiency and image quality.

57. As to claim 22, Yanagihara (modified by Pian, Hui and Kim) teaches a spatial predictor that predicts video data for a block of input data according to intra prediction techniques, a temporal predictor that predicts video data for the block of input data according to temporal predictions between a current picture and one or more previously coded reference frames, [Hui - figs. 2-3; col. 1lines 30-53; col. 5 lines 58-67; col. 6 lines 8-21; Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19] and a mode selector that selects an output from one of the spatial predictor or the temporal predictor for each block of input data, wherein the mode selector performs its selection based on mode decision control signals from the coding policy unit. [Hui - figs. 2-3; col. 1 lines 30-53; col. 5 lines 58-67; col. 6 lines 8-21; Yanagihara - fig. 11; fig. 14; col. 12 lines 20-38; col. 13 line 62 - col. 14 line 19]

58. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view of Hui US 6,654,417 B1 in view of Kim US 5,777,812 further in view of Alattar et al. US 7,567,721 B2.

59. As to claim 17, Yanagihara (modified by Pian, Hui and Kim) teaches the limitations of claim 16.

Yanagihara (modified by Pian, Hui and Kim) does not explicitly teach to eliminate non-zero quantized transform coefficients according to a rate control policy, and wherein the AVC coder further comprises a coefficient zeroer provided between the forward quantizer and the transform scaler, responsive to control from the coding policy unit, to eliminate selected quantized transform coefficients.

Alattar teaches to eliminate non-zero quantized transform coefficients according to a rate control policy, and wherein the AVC coder further comprises a coefficient zeroer provided between the forward quantizer and the transform scaler, responsive to control from the coding policy unit, to eliminate selected quantized transform coefficients. [col. 15 lines 22-35]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Alattar with the device of Yanagihara (modified by Pian, Hui and Kim) improving coding efficiency and maintaining and/or improving the bit rate.

60. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view of Hui US 6,654,417 B1 in view of Kim US 5,777,812 further in view of Takeuchui et al US 2002/0028061.

61. As to claim 18, Yanagihara (modified by Pian, Hui and Kim) teaches the limitations of claim 16,

Yanagihara (modified by Pian, Hui and Kim) does not explicitly teach a coding policy unit, to determine when it becomes necessary to eliminate pictures from the video sequence from being coded according to a rate control policy, and a video preprocessing unit, responsive to control from the coding policy unit, to perform frame decimation before pictures are input to the AVC coder.

Takeuchui teaches a coding policy unit, to determine when it becomes necessary to eliminate pictures from the video sequence from being coded according to a rate control policy, and a video preprocessing unit, responsive to control from the coding policy unit, to perform frame decimation before pictures are input to the AVC coder. [¶ 0073, 0107]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Takeuchui with the device of Yanagihara (modified by Pian, Hui and Kim) allowing for improved rate control and image quality.

62. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view of Hui US

6,654,417 B1 in view of Kim US 5,777,812 and further in view of Cheung et al. US 6,178,205.

63. As to claim 19, Yanagihara (modified by Pian, Hui, and Kim) teach the limitations of claim 16.

Yanagihara (modified by Pian, Hui, and Kim) does not explicitly teach to determine when it becomes necessary to eliminate motion vectors according to a rate control policy, and wherein the AVC coder includes a prediction circuit that generates motion vectors for prediction of video data of macroblocks in the input pictures and of video data for sub-blocks therein of various sizes, the prediction circuit responsive to control from the coding policy unit, to eliminate selected motion vectors from an output coded bitstream.

Cheung teaches to determine when it becomes necessary to eliminate motion vectors according to a rate control policy, and wherein the AVC coder includes a prediction circuit that generates motion vectors for prediction of video data of macroblocks in the input pictures and of video data for sub-blocks therein of various sizes, the prediction circuit responsive to control from the coding policy unit, to eliminate selected motion vectors from an output coded bitstream. [col. 8 lines 18-33; col. 8 line 60 - col. 6 line 5]

It would have been obvious to one ordinary skill in the art at the time the invention was made to incorporate the teachings of Cheung with the device of Yanagihara (modified by Pian, Hui, and Kim) allowing for improved image quality.

64. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Pian et al. US 6,366,614 B1 in view of Hui US 6,654,417 B1 further in view of Kim US 5,777,812 and further in view of Tsuru US 6,950,040 B2.

65. As to claim 20, Yanagihara (modified by Pian, Hui and Kim) teaches the limitations of claim 16.

Yanagihara (modified by Pian, Hui and Kim) does not explicitly teach a deblocking filter.

Tsuru teaches a deblocking filter. [fig. 2; col. 6 lines 3-12]

It would have been obvious at the time the invention was made to combine the deblocking filtering teachings of Tsuru with the device of Yanagihara (modified by Pian, Hui and Kim) improving image quality.

66. As to claim 21, Yanagihara (modified by Pian, Hui, Kim, and Tsuru) the coding policy unit calculates alpha and beta control parameters to be used by an H.264 deblocking filter. [Tsuru - fig. 2; col. 1 lines 12-15; col. 6 lines 3-12; well known in the art that alpha and beta parameters are used in deblocking]

67. Claims 34, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Sugiyama US 6,940,911 B2 further in view of Cheung et al. US 6,178,205.

68. As to claim 34, Yanagihara teaches a rate controller having an input coupled to a source of video data and generating a quantizer selection on a picture-by-picture basis, [Abstract; fig. 11; fig. 14; col. 12 lines 6-9; col. 14 lines 6-8] a video prediction chain to

generate predicted video data on a block-by-block basis, [fig. 11; col. 12 lines 6-9; col. 14 lines 6-8] and a quantizer to receive data output from the transform circuit, the quantizer operative according to a quantizer parameter output from the rate controller. [fig. 11; fig. 14; col. 12 lines 6-9; col. 14 lines 6-8]

Yanagihara does not explicitly teach as to a block-based video coding chain including: a subtractor coupled to the source video data and to the video prediction chain, a transform circuit, to receive data output from the subtractor.

Sugiyama teaches a block-based video coding chain including: a subtractor coupled to the source video data and to the video prediction chain, a transform circuit, to receive data output from the subtractor. [fig. 1; figs. 6-7; col. 10 lines 52-67; col. 14 lines 42-50; col. 15 lines 1-22]

It would have been obvious to one of ordinary skill in the art at the time the invention was made incorporate the teachings of Sugiyama teaches with the device of Yanagihara to improve image quality and coding efficiency.

Yanagihara (modified by Sugiyama) does not explicitly teach the video coding chain deletes motion vectors under control of the rate controller

Cheung teaches the video coding chain deletes motion vectors under control of the rate controller. [col. 8 lines 18-33; col. 8 line 60 - col. 6 line 5]

It would have been obvious to one ordinary skill in the art at the time the invention was made to incorporate the teachings of Cheung with the device of Yanagihara (modified by Sugiyama) allowing for improved image quality.

69. As to claim 38, Yanagihara (modified by Sugiyama and Cheung) teaches video prediction chain comprises a prediction mode decision unit whose mode of operation is controlled by the rate controller. [Sugiyama - fig. 1; figs. 6-7; fig. 11; fig. 14; col. 10 lines 52-67; col. 14 lines 42-50; col. 15 lines 1-22, 61-67; col. 16 lines 3-7]

70. As to claim 39, Yanagihara (modified by Sugiyama and Cheung) teaches a video preprocessor that performs picture decimation under control of the rate controller. [Sugiyama - Fig. 7; Fig. 11; Fig. 14; Col. 15 lines 10-19, 61-67; Col. 16 lines 3-7]

71. Claim 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagihara US 5,374,958 in view of Sugiyama US 6,940,911 B2 further in view of Cheung et al. US 6,178,205 further in view of Alattar et al. (Simpson) US 7,567,721.

72. As to claim 35, Yanagihara (modified by Sugiyama and Cheung) teaches the limitations of claim 34.

Yanagihara (modified by Sugiyama and Cheung) does not explicitly teach the video coding chain further deletes transform coefficients under control of the rate controller.

Alattar teaches the video coding chain further deletes transform coefficients under control of the rate controller [col. 15 lines 22-35]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Alattar with the device of Yanagihara (modified by Sugiyama and Cheung) improving coding efficiency and maintaining and/or improving the bit rate.

73. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hui US 6,654,417 B1 further in view of Sugiyama US 6,940,911 B2 further in view of Tsuru US 6,950,040 B2.

74. As to claim 37, Yanagihara (modified by Sugiyama and Cheung) teach the limitations of claim 34.

Yanagihara (modified by Sugiyama and Cheung) silent as to the video prediction chain comprises a deblocking filter whose mode of operation is controlled by the rate controller

Tsuru teaches the video prediction chain comprises a deblocking filter whose mode of operation is controlled by the rate controller. [fig. 2; col. 1 lines 12-15; col. 6 lines 3-12]

It would have been obvious at the time the invention was made to combine the deblocking filtering teachings of Tsuru with the device of Yanagihara (modified by Sugiyama and Cheung) **improving** image quality.

Conclusion

75. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNER HOLDER whose telephone number is (571)270-1549. The examiner can normally be reached on M-W, M-W 8 am-3 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Examiner, Art Unit 2621

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